Light and Lighting

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The Dow Prize

THIS month the first award of the Dow Prize will be made. The prize has been won by a team of six students which includes four who are prospective architects. The competition was intended to encourage collaborative entries by lighting and architectural students, and the fact that—unknown to the assessors—the entry they judged the best was the product of such joint endeavours confirms the wisdom of the oft-repeated plea for early co-operation between architects and lighting engineers to ensure the most suitable lighting of buildings. The prize is due to the generosity of the late J. S. Dow, whose life it commemorates. In the pages of this Journal—which he edited for many years—Mr. Dow often evinced his interest in the education of the young lighting engineer and his conviction of the desirability of better education of the young architect in the principles and applications of lighting. It is to be hoped that collaboration fruitfully begun in student days will become a habit of those who are about to embark on the careers of lighting engineer and architect, as well as that collaboration will become more general between those who are already well established in these professions.

Notes and News

The Dow Prize

Last year the Illuminating Engineering Society announced that in memory of John Stewart Dow a biennial competition would be held to encourage collaboration between students of illuminating engineering or those branches of engineering concerned with lighting and students in other fields in which lighting plays an important part. The closing date for the first competition was November 30, 1952, the prize being a cash award of £75.

The first competition was intended to encourage collaboration between engineers and architects and took the form of the layout, artificial lighting and decoration of a ground-floor showroom of a provincial shop selling sports goods. As the competition was an exercise in collaboration between art and science applicants were informed that while originality of design, effectiveness of layout and suitability of lighting would all receive consideration special recognition would go to schemes in which all three blended in unity.

Entrants were supplied with a site plan and asked to submit drawings to the scale of ¼ inch to 1 ft. showing plan, section of each internal wall face in colour, elevation of shop front, and lighting plan and schedule. An explanatory report of not more than 1,000 words was also required. Entrants could also submit if they wished explanatory sketches of special features and perspective drawings of the interior showing displays. Entrants were informed of the requirements of the client in regard to sales space and storage capacity and that the inside of the shop must be visible from the street.

In all the arrangements for the competition the I.E.S. had the co-operation of the Royal Institute of British Architects and the Institution of Electrical Engineers.

Twenty-six entries were received for the first competition, nearly all being from teams of engineers and architects, 55 students in all taking part.

Many schools of architecture, electrical engineering and illuminating engineering took an interest in the competition and entries were submitted by students from all over the country as well as from overseas.

The members of the winning team were :—

W. D. Tyrrell, Croydon Polytechnic (Illum. Engr.)
T. A. D. Bindon, South East London Technical College (Elect. Engr.)
E. W. Uglow, Regent Street Polytechnic (Architect)
S. M. Gray (Miss), Regent Street Polytechnic (Architect)
C. G. Crowfoot, Regent Street Polytechnic (Architect)

Next I.E.S. Meeting in London

The next I.E.S. sessional meeting in London will be a joint meeting with the Royal Institute of British Architects and will take place at the Lighting Service Bureau, 2, Savoy Hill, W.C.2, at 6 p.m. on Tuesday, February 10. At this meeting Mr. David Medd, A.A.Dipl., A.R.I.B.A., will lecture on the use of colour in schools.

A further sessional meeting will be held at the Lighting Service Bureau at 6 p.m. on Wednesday, February 25, when the entries for the Dow Prize Competition will be displayed and will be discussed by the assessors.

R. G. Smith, Regent Street Polytechnic (Architect)

Highly commended by the assessors was an entry from South Africa submitted by

R. S. Yates, South African College of Science and Technology (Illum. Engr.) and

J. Yorke-Hart, Pretoria University (Architect)

The entry by D. S. Bottomley, Huddersfield Technical College (Architect), and that by J. D. Vale, Birmingham College of Arts and Crafts (Interior Decorator), and N. E. Wilkinson, Birmingham College of Arts and Crafts (Industrial Designer), were commended by the assessors.

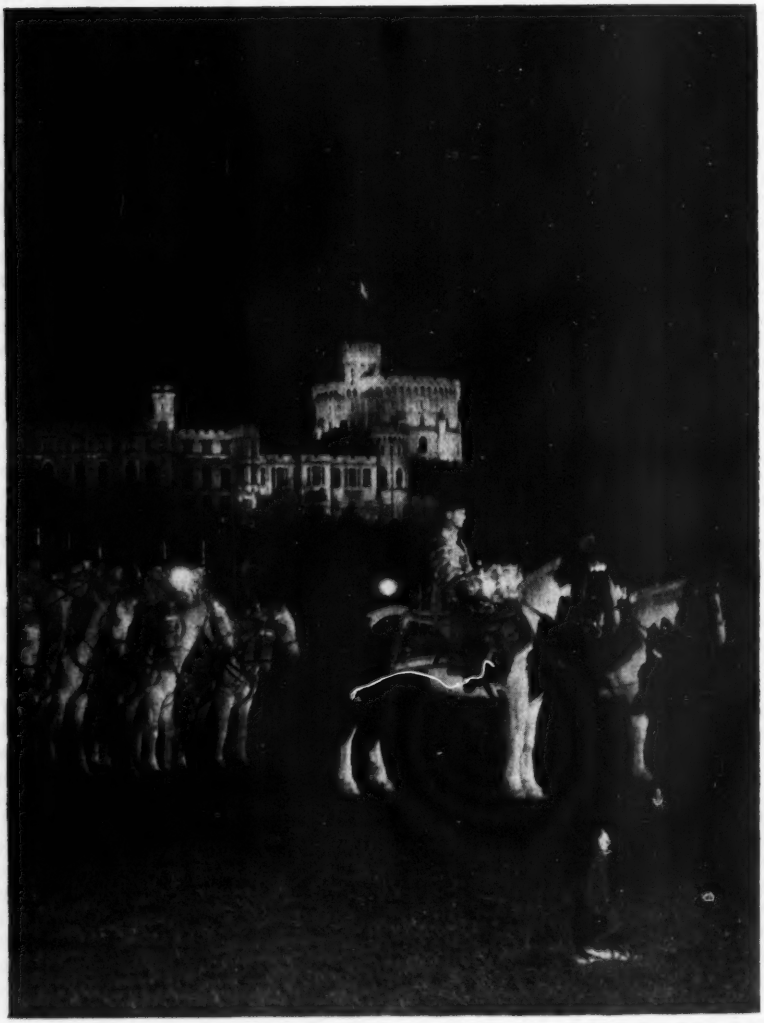
The entries for the competition will be on view at a special meeting of the I.E.S. at 6 p.m. on Wednesday, February 25, at the Lighting Service Bureau, 2, Savoy-hill, W.C.2. At this meeting (at which the awards will be presented) the assessors for the competition, Mr. R. O. Ackerley, F.I.E.S., and the Hon. Lionel Brett, M.A., A.R.I.B.A., will discuss the entries. The I.E.S. invites all who are interested to be present at this meeting.

It would seem that this first of the Dow Prize Competitions has been very successful in that it has achieved its object in encouraging at the student stage a closer collaboration between those concerned with the art and science of illumination.

Colour in Action

The value of colour in its practical applications is peculiarly difficult to assess. Quantitative methods of measuring "performance" are relevant hardly at all and it is not easy to appraise rationally aesthetic effects and feelings of well-being, exhilaration, tranquillity, etc., which colour schemes aim to produce. Perhaps an understanding of the role of colour is best obtained by learning from those who determine the colours to be applied what they are trying to achieve. This is what the Physical Society's Colour Group, at a recent meeting, heard from Mr. Oliver Cox, as far as the architectural use of colour in schools is concerned. Mr. Cox is one of a group of young architects who have applied modern principles of design to new schools in Hertfordshire, and it was with these schools—all primary schools for younger pupils—that he dealt in the main. He stressed the application of colour for accentuating structural features, e.g., the picking-out in colour of the lattice work of supporting girders; the constant use by the architects of preliminary coloured sketches showing in correct perspective the colour scheme as it would appear from different viewpoints taking into account the colours of neighbouring rooms or corridors or the external scene seen through or by reflection in glass partitions which were much used; the specification of suitable ranges of colours, defined in the Munsell System, to which the paint manufacturer had to supply; the choice of colour to suit the lighting (only daylight was considered as the schools are rarely used after dark); the use of more saturated colours than customary to produce interesting effects; the addition of frescoes harmonising with the general colour scheme; the distinctive colouring of certain fitments, some of which could be exposed or covered as desired, both for ready identification and as elements in the colour scheme. An extremely interesting series of colour-photographs of the Hertfordshire schools enabled Mr. Cox to illustrate many of his points. To the question, put in the discussion, whether the colour schemes produced desirable effects on the children, the lecturer was able to produce evidence from the children's own "illustrated" compositions that they were at least very conscious of their highly coloured environment. In another answer, Mr. Cox explained that the application of colour in schools for older pupils raised somewhat different problems which were being studied.

This subject of the use of colour in schools is also to be discussed by the I.E.S. in London on February 10, when Mr. David Medd will put forward the views of the Ministry of Education.



Floodlighting at Windsor, one of the many places to be floodlit during the Coronation.

Lighting on Farms

By W. ROBINSON, B.Sc.(Eng.)
A.M.I.E.E., F.I.E.S.

The following article is based on research carried out on experience in the design of lighting for farms and is intended to stimulate interest in the subject.

More than 100,000 farms in Great Britain now have an electricity supply and farm electricity consumption has doubled since 1947. There is still, however, a very large number of farms without a mains electricity supply and the lighting of those farms which have an electricity supply is below the necessary standard. In general, it might be said that most of the lighting educational and promotional activities of the last two decades has had little impact on the farming community, a large section of which is undergoing a process which most of the other sections of the community have almost forgotten, i.e., the introduction to electric lighting. In this respect the situation has not changed greatly; just as in the early days of electrification the stimulus was the desire for electric lighting so, to-day, electric lighting is the overriding factor in farm electrification and is the first stage thereof. The situation, however, has changed in so far as there is now available a wide variety of excellent lamps and lighting equipment and a much more highly developed technique than in the past. Even so, the farming community as a whole is far from being light-conscious, and unless a determined effort is made in the direction of establishing a sound basis of farm lighting practice there is a grave danger that farm lighting will continue to be the Cinderella of the lighting art.

The following notes are based on research into current practice and on the experience gained in designing the lighting of a working farm. It is hoped that the recommendations made in this article will be received, as they are offered, as a stimulus to increased activity and a greater flow of information

Fluorescent lighting in a modern cowshed.

Recommended Illumination Levels for Farmsteads

Location of Task	Recommended service illumination on horizontal plane at working level (lm./ft.^{2})
Barn	
Storage, granary	2
Food preparation	6
Cowhouse	
Where milking takes place	10
Where milking does not take place	6
Feeding-passage	2
Dairy	
Boiler-house	2
Milk-room	10
Washing and sterilizing-room	10
Grain Drying	
Drying and storage	2
Plant and Processing	10
Fertilizer Store	2
Implement	
Store	2
Maintenance	10
Loose-boxes	
Bull, calf	2
Isolation calving	10
Milking-parlour	10
Passage	2
Piggery	
Pig-house, boiler-house, farrowing pen*	2
*(Provision must be made for use of portable lamps for veterinary purposes)	
Poultry	
General	2
Extended hours	10
Stable	
Stall or loose-box	2
Harness-store	6
Stockyard (covered)	2
Workshop	10

on the subject, rather than as a statement of firmly established practice.

Illumination Recommendations

The table (this page) of recommended values of illumination is based on a very broad comparison with I.E.S. Code recommendations for equivalent occupations when they are listed, and on the recommendations contained in the lighting section of the Draft Code of Practice for Farm Electrical Installations. The values shown should be regarded as representing a reasonable standard likely to be acceptable and capable of being justified, but it will be appreciated that normal farm buildings are small and great precision is not always practicable.

General Considerations Affecting Farm Lighting Practice

In planning electric lighting account must be taken, at an early stage, of the limitations imposed by the structure and of the method, and adequacy, of the natural lighting indoors.

Farm Buildings

Traditional buildings follow a more or less standard pattern of design, the construction having been influenced by the proximity of suitable material. In the main they are all poorly served for natural lighting, largely due to the low eaves, great wall thickness and absence of windows.

Thatch, stone tile or slate roofs are traditional types which present difficulties in providing roof lights. Corrugated asbestos cement and sheet-iron roofs are more likely to have roof lights and transparent plastic sheets are often used instead of glazed roof lights.

The heavy stone walling of many traditional buildings is also responsible for a scarcity of side windows, and even where they are provided, their effectiveness is much diminished by the thickness of the walls.

Stairs to granaries and lofts in such buildings are usually dark and difficult to negotiate. Many farm buildings were originally built as stables, and, with the advance of mechanisation and the decline in horse population, have been converted for use as byres, loose boxes, workshops, stores, etc.

Many old cowsheds have low ceilings, or low eaves, beaten-earth floors with wooden partitions and walls, together with rudimentary ventilation and drainage. Provision for natural lighting is often poor or even non-existent in the traditional type of animal accommodation. Old-style barns are usually

Lighting arrangement in a large milking parlour.

ill-provided with natural lighting. In some cases an upper floor has been added to form a granary. Access to upper floors and operations carried out there entail considerable danger to workers unless adequate light is available.

It is becoming increasingly common to have a farm workshop for repair of tractors and implements, and traditional buildings may be utilised for this purpose, with all the disadvantages usually involved in providing natural lighting.

Modern farm-building design tends to favour the use of prefabricated steel or concrete framing with concrete block infillings, and roofing of corrugated asbestos cement. This form of construction makes for cleanliness and good natural lighting, with wall or roof lighting or both. In cowhouses and dairies, in particular, wall finish is normally white or cream, to the benefit of the interior lighting as well as of cleanliness.

Dutch barns are favoured for housing hay and straw, and often house grain and grass-drying plant. The barn may be merely a roof supported on steel or concrete stanchions, or it may be wholly or partially clad on the sides and ends. Where it is enclosed and houses the grass and grain-drying plant, electric lighting is essential, particularly as these plants are used during the season for 24 hours a day.

Farm Routine

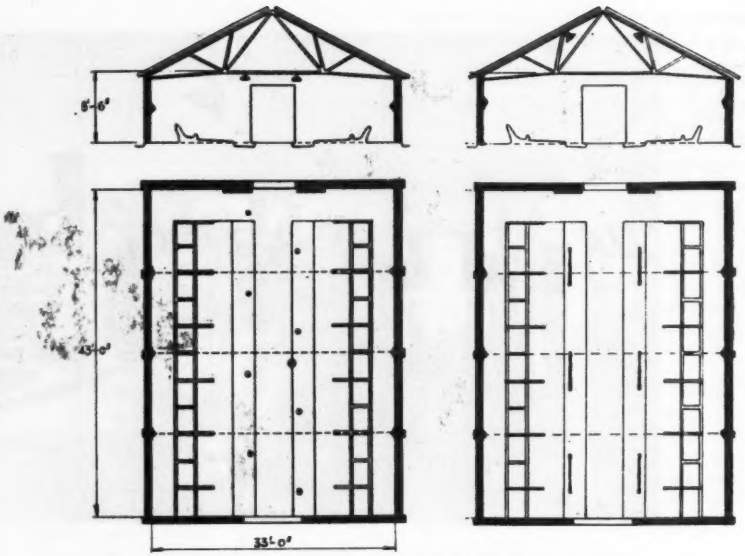
The lighting requirements on a farm are obviously closely related to the farm routine. The following indicates some of the activities in which artificial lighting plays an important part.

Dairy Farming

Many of the duties connected with milk production are, for almost half the year, carried out during the hours of darkness. During such times operations involve considerable movement by workers in the attendance of livestock, milking and milk treatment. Scrupulous cleanliness at all stages can only be achieved when work is undertaken in well-illuminated surroundings. The washing of udders and milking routine call for adequate lighting of the working area. Subsequent treatment of milk in the dairy entails the use of labour, the efficiency of which is greatly enhanced and wastage minimised in well-lit conditions.

Another factor of primary importance is the washing and sterilising of equipment and utensils used in the milking operations. Here, also, adequate lighting is essential to ensure thorough cleansing.

Emergencies, such as sickness or calving, are not infrequent at night and may entail attendance and light in which to work.



(Left) Filament lighting layout for a double range cowhouse. When there are no feeding passages side lights may be dispensed with. (Right) Alternative layout, using fluorescent lamps.

Arable and General Stock Farming

Grain and grass-drying plants require lighting for round-the-clock activities. Granary routine involves carrying, cleaning or milling of grain. As a high proportion of animal feedings-stuffs is now home-grown, crushing and milling for stock feeding is extensively employed during the winter months.

The mechanisation of farming to-day involves the farmer in an appreciable amount of maintenance and repair of machinery. Opportunities for such work mainly arise in the evenings or in the relatively slack winter period when hours of daylight are short.

Intensive systems of housing pigs and poultry, together with the necessary attendance, food preparation and feeding are other aspects of farming routine in which much of the work has to be carried out during periods when hours of daylight are short.

Lamps and Lighting Equipment

Choice of Lamps for Farm Lighting

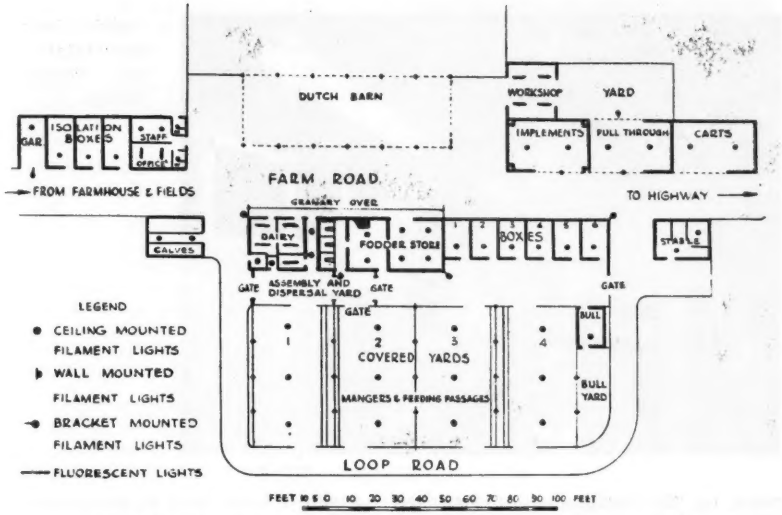
Tungsten filament lamps are cheap, reliable, easy to install and maintain, but there are, nevertheless, situations and circumstances which favour the newer light sources. Fluorescent lighting, in particular, has much to commend it where a good quality of lighting is needed. In dairies and milking sheds, for instance, the daylight colour and excellent diffusion of fluorescent lamps are considerable assets in the production of clean milk. Similarly, in workshops and implement sheds where maintenance is carried out, fluorescent lighting is unexcelled. In situations like these the quality of light may well be the deciding factor in the choice of lamps, while in other parts of the farmstead the decision is likely to be more affected by first cost.

Mercury and sodium discharge lamps are not likely to find general application indoors, but may well be put to good use for area lighting or for the lighting of very large barns or sheds where colour discrimination is not important.

Lighting Fittings

Out of the available range of fittings the following will meet most farm lighting requirements:—

Dispersive Reflectors	For granaries, stores, workshops and general use.



Layout of combined filament and fluorescent lighting for a 250-acre mixed farm with a covered yard and milking parlour.

Angle Reflectors .. For implement sheds, dairies, or as alternative to overhead general lighting in low buildings.

Vertical Elliptical Reflectors ..... For corridors, feeding passages, etc.

Bulkhead Fittings . For interiors where space is limited or robustness essential, or for exteriors.

Well Glass Fittings ..... For exterior lighting and exposed sheds.

Area Lighting Fittings ..... For lighting cattle-marshalling areas, etc., from medium height.

Floodlighting Projectors ..... For area lighting where advantage can be taken of a greater mounting height available as, for instance, on a silo.

Handlamps ..... For supplementary lighting. Should be of the all-insulated type. Low-voltage equipment is recommended.

Fluorescent Trough Fittings . Will meet most fluorescent lighting requirements. Fittings in cowhouses and dairies should be vapour- and corrosion-proof.

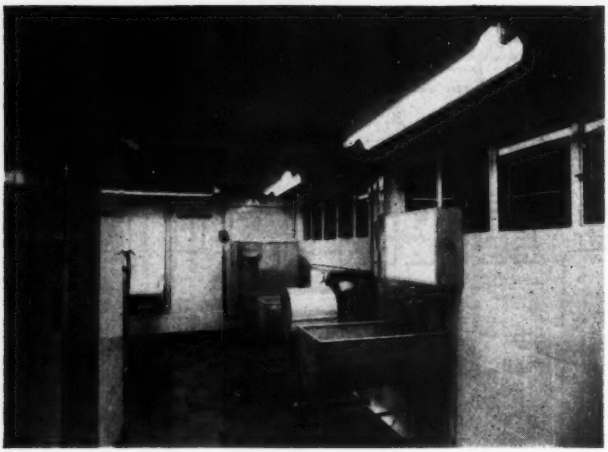
Recommended Lighting Practice

Bulk Stores and Granaries

This building will often be built in two storeys, food being stored on the top floor and prepared on the ground floor. The minimum recommended illumination is 2 lm./ft.^{2} for the storage floor and 6 lm./ft.^{2} for food preparation. In practice it will usually be advisable to provide more than the minimum illumination for storage so as to reduce the contrast between the illumination in the storage space on the one hand and the intercommunicating food storage room on the other. Where storage and food preparation occupy a single room or adjacent rooms on the same level, the higher illumination required for food preparation might with advantage be adopted over the entire storage and preparation area. Overhead dispersive fittings in a symmetrical layout will usually be satisfactory, though where mixing machinery, bins, etc., are in fixed positions the lighting layout may be adjusted to localise maximum illumination on the working areas or inside bins.

Cowhouses

Illumination must be adequate to ensure cleanliness throughout the entire building, with particular emphasis for milking pur-



Lighting in a farm dairy using fluorescent vapour-proof fittings.

poses on the illumination at the cows' udders and hence on the dung channel. Lighting may be provided by overhead dispersive reflectors, or by pendant or wall-mounted angle reflectors directing light mainly towards the udders or, where the cowshed is relatively narrow, by bulkhead fittings mounted on the wall behind the standings. Feeding passages will usually require a lower level of illumination from fittings spaced along the passage. Recommended minimum illumination is 10 lm./ft.^{2} for milking and 2 lm./ft.^{2} at the feeding passage. Special consideration should be given to the use of fluorescent lighting in cowsheds since the colour and penetrative qualities of this lighting are great assets, quite apart from possible economies in the overall lighting cost.

Milk bottle inspection with luminous panel.

Fittings used in cowhouses should be vapour-proof or have vapour- and acid-resisting finishes, preferably vitreous enamel or equivalent. Earthing protection is particularly important.

Portable lights are, in themselves, not sufficient for permanent lighting, but provision should be made for very low voltage (12 volts preferably) portable lights for emergency use. Nothing but very low voltage equipment should be used near to animals.

Milking Parlour

As an alternative to milking and housing in cowhouses, the cows may be milked in a milking parlour and housed in existing adapted buildings or in covered or partially covered yards.

In any type of milking parlour the illumination requirements are similar to those in milking cowhouses.

Dairy

The essential building requirements of a modern dairy are:—

(i) A cooling room,

(ii) A washing and sterilising room with utensil store, and
(iii) A boiler room, where necessary.

For small herds and where milk is immediately despatched the dairy may consist of a single large room.

Milk Rooms

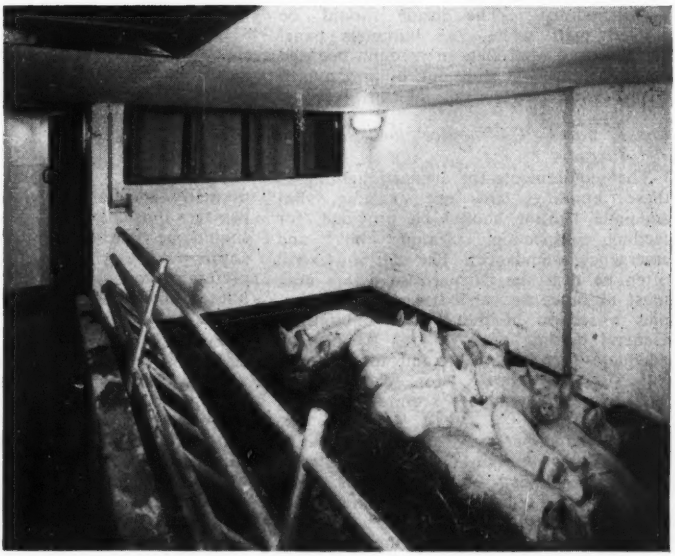
A minimum illumination of 10 lm./ft.^{2} is required in milk rooms, and washing and sterilising rooms. Overhead fittings which give a degree of diffusion will be better since dairies often contain a lot of plant in relation to their size, and the softer shadows from diffused lighting greatly improves working efficiency. Fluorescent lighting has, in addition to high diffusion, the advantage of natural colour rendering and cool running. Also, where indoor daylighting is not very good, necessitating greater usage, fluorescent lighting may be more economical than filament lighting. Vapour-proof fittings are recommended and finishes should be corrosion resistant.

Bulk-head fittings for loose box lighting.

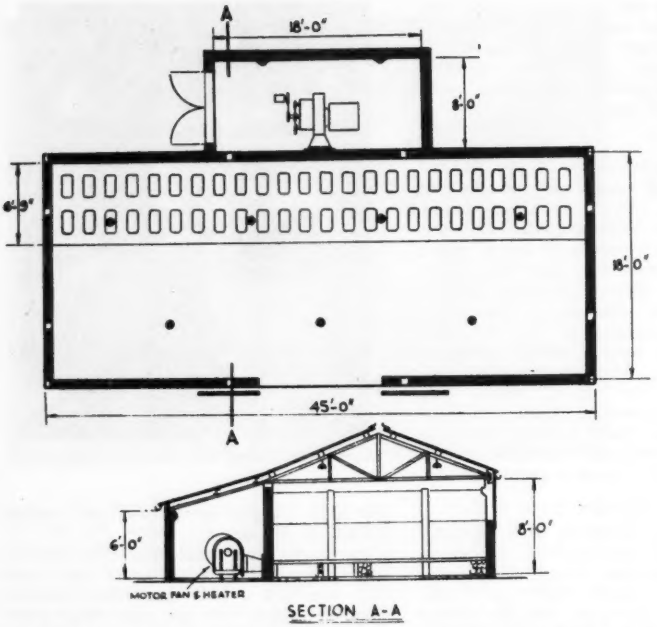
Inspection of Milk Bottles

For milk-bottle inspection after washing, a luminous panel, lighted from behind by filament or fluorescent lamps, is a great asset. The panel may be built into a wall at approximately eye level, and the bottles viewed in front of it, or may take the form of a sloping desk top over which the bottles are held. Impurities or dirt are sharply defined in silhouette.

To ensure even panel brightness, filament lamps should be spaced apart not more than one and a half times their distance from the glass, and not more than three-quarters of this distance from the sides of the lamp container. A box about 2 ft. wide



Corner mounted bulk-head fitting for lighting a pighouse.



Lighting layout for in-sack grain-drying plants housed in a Ministry of Agriculture standard building.

by 1 ft. 6 in. or 2 ft. high, containing two 2-ft. fluorescent lamps, or four 40-watt filament lamps spaced as indicated above, is satisfactory. The inside should be painted matt white, the luminous panel being flashed opal glass or medium opalised plastic arranged to slide out, or in a hinged frame, for access to the interior.

Loose Boxes, Calf-houses and Isolation Boxes.

The requirements for artificial lighting in these buildings are not exacting, but adequate lighting should be provided for feeding, inspection, cleaning out and emergency attendance. The calf-house will often be near the dairy (from which milk must at times be carried) and often occupies a section of the loose-box building. General lighting of 3 lm./ft.^{2} is normally adequate for calf-houses and loose boxes, but isolation boxes for calving and veterinary treatment require at least 10 lm./ft.^{2}.

Overhead dispersive fittings may be used, but in low buildings, ceiling or wall-mounted bulkhead fittings may be more satisfactory. Lighting fittings should be out of the animals' usual line of vision and out of their reach. The lighting of feeding passages should be the same as those in cowhouses.

Stables

Lighting requirements are generally similar to those for loose boxes. Artificial lights *must* be behind the horses, and should be fixed so that they are immune from damage by kicking, rearing, etc.

Pig-houses

Two lm./ft.^{2} of general lighting is normally adequate. Dunging and feeding passages must be well lighted and the lights should be placed accordingly. Wall- or corner-mounted bulkhead fittings are often preferable to overhead lighting in low pig-houses and pigsties.

Implement Sheds

A covered space to house tractors, implements, etc., is a necessary feature on any farm with mechanical equipment. Whatever temporary accommodation may be provided it will sooner or later become necessary to have a permanent building in which proper care can be taken of the costly equipment. Illumination of 10 lm./ft.^{2} is recommended, but provision can be made for only a portion of

this, say, 2 lm./ft.^{2} to be switched on for parking.

Careful consideration should be given to the lighting layout, since when work is being done on implements the light is required to penetrate into the equipment. Lighting from directly overhead does not necessarily accomplish this, and a better arrangement is often to provide part of the light by overhead fittings, on a separate switch, for parking and manoeuvring purposes, and in addition angle lighting from the sides to be used when work is done on the equipment. It will be found that carefully placed side lighting will enable most maintenance work to be carried out without the use of hand lamps, which need then only be used for particularly inaccessible positions. Socket outlets should be provided at convenient points for hand lamps and movable stand lights.

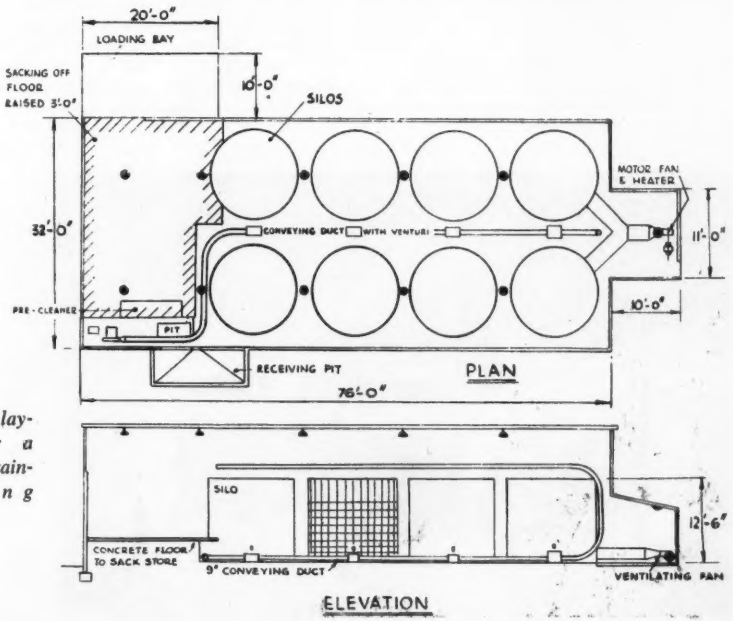
Workshops

A permanent workshop has become an almost essential feature of mechanised farms. On small farms this may consist of a workbench and plant in the implements shed, in which case the only additional lighting required will be local lighting for the workbench area. This may be provided by adjustable local lighting brackets, but a better solution will usually be to mount one or more fluorescent trough fittings (according to the length of the bench) in line and directly above the front edge of the bench at a height of about 7 ft. and to provide a supplementary local lighting bracket fitting for specially fine or difficult work.

Where the workshop is separately housed the bench lighting should be accompanied by general lighting of normal industrial standard, an overall illumination of 10 lm./ft^2 being recommended. Fluorescent lighting is undoubtedly superior for this purpose.

Poultry Houses

Artificial illumination of not less than 2 lm./ft.^{2} is required to enable routine duties to be carried out in battery houses. It is also being incorporated in all types of poultry houses as a means of increasing winter egg production. For this purpose illumination of 10 lm./ft^2 is recommended, the artificial lighting being controlled by time-switch so as to provide a minimum of 14 hours of lighting daily throughout the year. The time-switch may be set to switch on the lights in the early morning and off at dawn (morning lighting) or to switch on at dusk



Lighting layout for a silo grain-drying plant.

and off during the night (night lighting). Opinions differ as to the relative effectiveness of the two methods, but when night lighting is used it is essential for a short period of low intensity "roosting" light to be provided before complete blackout. With morning lighting this is unnecessary and some expense is saved in installation.

In small houses bulkhead fittings are space saving and virtually immune from damage, but in larger houses dispersive fittings should be used for their higher efficiency. Particular attention should be paid to the lighting of feeding and drinking troughs.

Exterior Lighting

It will not usually be practicable to provide all the exterior lighting that one would like around the farmstead. There are many opportunities, however, for ingenuity in getting the best out of a restricted number and wattage of outside lights, and the following notes will be helpful in this connection.

The most usual form of outside light is the well glass fitting, either mounted under the eaves or bracketed from buildings. In certain cases it may be necessary to mount the fittings on poles, but this is clearly to be avoided where possible. Since it will not usually be possible to illuminate the entire farmstead area outside lights should be sited as far as possible so that they indicate as clearly as possible :—

(1) The outline of the buildings;
(2) Well-used routes;
(3) The ends of throughways or paths;
(4) Building entrances;
(5) Obstructions, parked equipment and danger spots, pit silos, dungsteads, etc.

If these are clearly indicated much of the difficulty attending movement and work in the hours of darkness can be removed with the use of the minimum amount of outside lighting.

In general, fittings should be mounted between 10 and 15 ft. from the ground, but circumstances may compel mounting lower than this. Particularly suitable locations are over main entrances, or between entrances close to each other, and at building corners where they can be bracketed out at 45 deg. to light along both sides. Brackets should always be kept as short as possible. Often lights can be made to serve a dual function, either by siting outside lights so that they shed light into barns or, conversely, by siting lights of covered, but open-sided areas, so that they light up the surrounding open spaces. This applies particularly to lights in or near dutch barns, open-fronted implement sheds and the like.

Bulkhead fittings are good substitutes for well-glass fittings where space is restricted or, for any reason, fittings must be sited within reaching distance. They should not normally be used vertically on walls for exterior lighting, since they may be glaring and little light will reach the ground immediately below. In general, well-glass fittings should be used wherever possible because of their higher efficiency.

Pearl or silica-coated lamps should be used in well-glass reflectors. Clear lamps

Implement shed with overhead parking light and side lighting for maintenance work.

are not recommended, since they increase glare and shadows without giving appreciably more light. Alternatively, diffusing well glasses may be used.

Area Lighting

Stock assembly and manoeuvring and work on large equipment such as threshers and harvesters can be carried out independently of daylight if area lighting is provided. Area lighting fittings are very suitable for this purpose and can be mounted on buildings overlooking the area or on poles. For this duty close beam control is not required. Good weatherproofing, ruggedness and a fairly wide, uniform distribution of light are the main requirements.

Floodlighting

Floodlighting projectors differ from area lighting fittings in that they produce a controlled beam of light by means of an optical system and the lamp is normally enclosed. Although more expensive in first cost than area lighting fittings they may prove more satisfactory for yard lighting where a tall structure, such as a tower silo, overlooks the yard. A high-mounted floodlight may do the work of several area lighting fittings with savings on installation costs which more than offset its extra first cost. This method also avoids the problem of finding suitable mounting points which also coincide with the spacing requirements of the fittings. It is important that floodlights so used should be fully weatherproof since they may only receive attention when lamps have to be replaced.

Protective and Alarm Lighting

The danger of stock theft can be greatly reduced by lighting, which may be planned either to deter intruders by eliminating all dark areas or, where regular patrolling is in force, to facilitate detection of intruders by the patrol.

Area or floodlighting may be used throughout the hours of darkness with time-switch or manual control, or the lighting may be controlled from, say, the farmer's bedroom to be switched on at the first sign of anything untoward.

Stockyards

Lighting of partially covered yards may be provided by bulkhead fittings spaced in one or more rows on the roof of the covered portion. Wall-mounted fittings are not usually advisable in this instance because of the possibility of glare when seen from the open and relatively dark parts of the yard and because of their possible disturbing effect on animals. Fittings should be spaced along the inner edge of the covered part so that the open area receives part of their light, and in rows near the wall side of the covered part to light mangers spaced along the walls. Additional intermediate rows of fittings may be required where the roofed portion is particularly wide. Illumination of approximately 2 lm./ft.^{2} will be adequate.

Lighting fittings for covered yards will not normally require to be fully weatherproof, and advantage can be taken of the higher efficiency of standard dispersive reflectors, though porcelain lampholders are recommended. General overhead lighting of 2 lm./ft.^{2} will be adequate.

Lighting Layouts

A number of illustrations of lighting layouts applicable to various types of farms are given in this article. These layouts do not apply to any single existing farmstead but conform to the general recommendations made above. It is recognised that typical lighting layouts introduce the risk that they might be taken too literally and applied too rigidly; for this reason lamp wattages and types of fittings are not indicated but are left to the engineer on the spot. Wherever possible the layouts are superimposed on standard buildings of the type put forward by the Ministry of Agriculture and Fisheries.

Conclusion

Although farm lighting introduces no particular technical problems, it does represent a relatively unexplored field of lighting activity and an opportunity for concerted action to establish a reasonable standard of farm lighting practice which is not beyond the means of the average farmer. Those most immediately concerned are the rural electrification representatives of the electricity boards at district level and local contractors, and it is largely the nature of their approach to the farmer that determines the standard of farm lighting. They will best serve their farmer clients by putting common sense before foot-candles while at the same time adhering firmly to a standard of lighting which is not inferior to that in other branches of industry.

Coronation Decorations

By BEVERLEY PICK,
M.S.I.A.

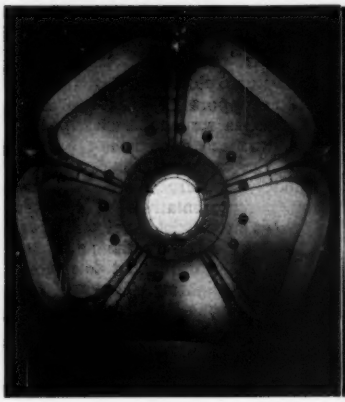
All over Britain Coronation decoration schemes, in which lighting plays an important part, are being prepared. The following article describes some of the ideas which are being put into practice.

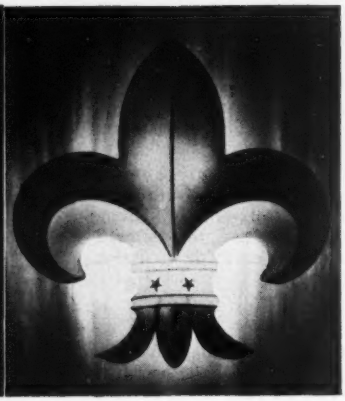
Preparations for the decoration of streets and buildings up and down the country in time for the Coronation of Queen Elizabeth are now in full swing, and it is becoming increasingly obvious that the forthcoming celebrations are likely to surpass in splendour and public enthusiasm anything seen before.

In London the tenants of entire streets have achieved the seemingly impossible by clubbing together in order to achieve a uniform scheme for their street. Regent Street took the lead in selecting a scheme based entirely on a dramatic use of the English hedge rose as a symbol. Piccadilly, Bond Street, Coventry Street, Haymarket, and many others are following suit with varying schemes in an almost unprecedented attempt to turn large sections of London's West End into a well planned and carefully co-ordinated spectacle, which in its colour, its ingenuity, its artistic imagination and, above all, in its gaiety, will express to the world the nation's pride in its young Queen.

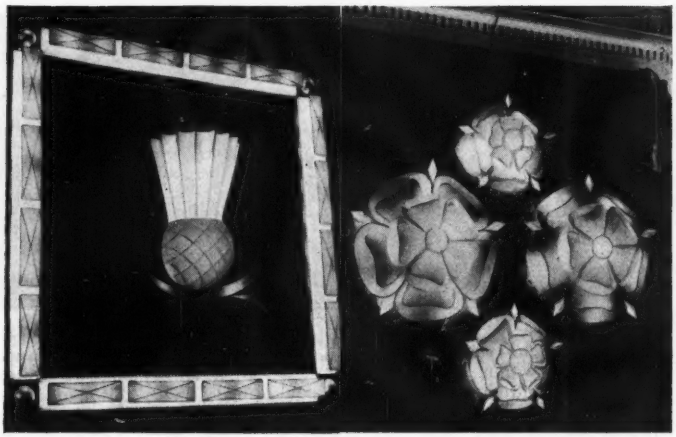
Festivities of this kind are rarely conceived without the aid of illuminations and electrical installations in all their various aspects. In spite of the fact that the Coronation is taking place in June with near maximum daylight, illuminations seem to be playing an important part in Coronation planning. Such plans for illuminations are naturally concentrated in town centres and London's West End, where the public is likely to remain outdoors long after dark, an assumption which may be taken for granted, bearing in mind also the many thousands of overseas visitors expected in London at that time.

In the past the principal method of illuminating buildings or decorations at night





(Left) One of the thousand illuminated roses specially designed for the Coronation, and (right) a Chrysaline fleur-de-lis in red, pale blue and white which is also to be used extensively.



(Left) Decorative thistle and border made of Chrysaline for use over main entrances and round window frames. (Right) Chrysaline Tudor roses in two layers and lighted, from behind, by tungsten lamps.

has been to outline devices or buildings themselves with lamps in various colours or, more recently, to floodlight. The impetus of the Festival of Britain and its many novel lighting features and the recent introduction of new and revolutionary lighting techniques have greatly increased the scope of the whole question of illuminated decorations, adding a new chapter to the very old urge to celebrate great events with light.

Perhaps it may be said of past celebrations of this kind that the artistic standard of the various decorations left much to be desired and that design in its more sophisticated form played but a small part in their planning. More often than not beauty had to give way to function, dignity lost out to stunts. Good design, as with so many other fields, is now looked upon as a very essential factor, and in the planning of Coronation decorations—leading designers and artists are being called in for consultation and steps are being taken in every direction to ensure that schemes meet with the approval of a public, nowadays accustomed to presentation standards of a much higher order.

One of the first problems with which a designer is confronted in planning illuminated decoration schemes is to ensure that his treatment is equally effective in daytime as well as by night, particularly on this occasion in view of the time of the year. Installations which appear brilliantly colourful by night but drab and forlorn during the day will not do. Strings of lamps looking merely like strings of lamps when unlighted are no longer the only method of obtaining effects. There are now newer and better ways of illuminating symbols and devices than by covering them with a network of lampholders and cable interfering by day with the beauty and shape of the design. Finally, a great deal of development has taken place in the whole field of floodlighting, making it possible to turn proud buildings into shining fairyland castles at night, reflecting all the colours of the rainbow.

Perhaps one of the most recently introduced lighting developments to make its début in the field of illuminations is the Chrysaline process, which makes possible the production and use of devices which are lit from within and look equally effective and colourful by day and night. This patented process is based on the spray application of a liquid plastic over wire armatures of the required shape, which dries into a tough and extremely transluscent skin, the accompanying shrinkage process adding greatly to the potentialities of achieving shape and depth. The General Electric Company, Strand Electric, and others are making available for the Coronation an extensive range of Coronation symbols produced by Chrysaline, Ltd., which, because of their lightness and weatherproof qualities and brilliantly colourful day and night appearance, are proving of considerable interest and may, in fact, be expected to constitute an important aspect of many Coronation schemes.

The scheme for Regent Street alone incorporates as one of its features 1,000 Chrysaline devices in the shape of formalised English hedge roses of 3-ft. and 5-ft. diameters, which, positioned on first-floor level along

(Left) One of a new series of decorations made of fluorescent Rhodoid. (Right) suggested motif using this decoration.

both sides of the entire street and illuminated from within after dark, may be expected to introduce an unusual and dramatic effect. Perhaps the outstanding characteristic of these new decorations is the apparent absence of any visible means of illumination, the whole unit giving the impression of glowing with incandescent light when positioned against the dark background of a building or the sky itself.

For general garlanding purposes, decoration round masts, lamp-posts, etc., and some attractive illuminated artificial flower decorations have recently come on to the market which should prove a very great asset. Prominent in this field are the fluorescent Rhodoid flowers, which are lit by internally placed pygmy lamps. Garlands made up in this material, and illuminated at night, give a delightful, light-hearted impression. These fluorescent Rhodoid flowers may also be externally lit by U.V. lighting, which produces the now familiar effect at night. Their day-time appearance, too, retains the fluorescent character comparable to that of day glow paint with all its attendant brilliance. A suggestion which may prove useful in connection with these flowers is that the Royal Cipher or Initials may be made up from this material. This treatment should prove particularly suitable over archways, main building fronts and suspended across streets.

An artist's impression of how Regent Street will appear during the Coronation.

Ultra-violet lighting will prove practical only when used for indoor schemes. Coats of arms, royal ciphers and other principal Coronation symbols painted in fluorescent paint, and illuminated from well-concealed U.V. reflectors, should make attractive features in hotels, restaurants, cinema foyers, etc.

It should perhaps be said that all those responsible for the planning of Coronation decorations must bear in mind that most buildings have a character and line of their own carefully planned by their original architect, and the placing of drapes and illuminations must be in keeping with the particular characteristics of the building if its beauty is not to be marred. A building with strong vertical features, for instance (and most buildings fall into this category), should not have mainly horizontal decorations placed arbitrarily across its frontage. A careful study of the available materials and the use of maximum ingenuity in devising new means of lighting will ensure that the Coronation period will become the joyous and sparkling occasion that we all intend it to be.

Coronation Lighting

Some suggestions for lighting as a means of celebration during the coming Coronation.

By B. F. W. BESEMER,*
Assoc. I.E.E., F.R.S.A.,

Man has used light as a symbol of reverence and of jubilation from the earliest times and, with the almost unique exception of the statue of Pallas Athene in the Parthenon at Athens, which was floodlit by natural light, such lighting was by candles. Constantine rebuilt Byzantium, renamed it Constantinople and ordered celebrations which included a candle to be set in every window, whilst 1,600 years later candles in Chinese lanterns and fairy lights still formed the principal source of light for the national illuminations when King George V was crowned in 1911.

It was not until 1931 that we really broke away from the candle convention and adopted floodlighting, with its astonishing revelation of the beauty of familiar buildings, as an expression of festivity. In fact, so effective was floodlighting and so cheap and simple once the fence of the initial cost had been taken that, in London at any rate, it is brought into use on every occasion that offers, now that restrictions on the use of energy have been removed.

Although floodlighting is a commonplace in London, however, it is far from being so throughout the country, and there are many gems of architectural beauty which might well be made to enrich the night, for the Coronation to begin with and thereafter at negligible cost on all local high days and holidays.

A kindred, if less ambitious, scheme is the floodlighted flagstaff. A brightly lighted flag streaming gently in the breeze against the background of the night sky is always a stirring sight, no matter how familiar or even ugly may be the church tower, town hall roof or castle turret on which the staff is mounted. A word of warning is necessary here: do not spare the watts and be sure to install projectors of the proper distribution for your particular situation. The flag that, from the foot of the mast, looks more than adequately lighted, may well be scarcely visible half a mile away. It will seem quite unnecessarily bright close at hand if it is to be effective at a distance against a starlit night sky.

One of the most modern materials suitable for illuminated emblems is that developed to "wrap ships in mothproof cocoons." Over a shaped wire frame the material is sprayed to form a weatherproof webbing, which is then coloured appropriately. Rings in the frame take shade-carrier holders. These emblems are tough, light, virtually waterproof and available in standard designs from several suppliers, whilst special designs can be made to order, if the orders arrive before all available output is bespoken. Visitors to the Battersea Gardens last year will remember the animals in the Tree Walk, which were made on this principle.

Mention of gardens takes us to what perhaps is the most effective of all such lighting arrangements. There must be many who remember the occasion in the 1930s, when St. James's Park was illuminated. Little reflectors, often housing nothing larger than a 100-watt lamp, were mounted on sticks stuck into the flower-bed or grass verge and, with the light source effectively screened from the viewers, provided feasts of delight to the eye. The general idea is adaptable over an almost limitless range of costs, and there can hardly be a single village in the whole of Britain which cannot light some little cluster of flowers or trees in a local beauty spot, whether it be in some dell, churchyard, castle or even in front of the town hall or a cottage garden. For the civic authority with the money there is an ample selection of suitable floods and mushrooms and reflectors in the catalogues of most of the electrical equipment makers, whilst for the private garden, home-made reflectors of cardboard can provide primitive but adequate light control, to screen the light from the observer and from spilling beyond its intended objective.

* Registered Lighting Engineer (I.E.S.)

Coronation Fittings

Brief descriptions of some of the wide range of decorative lighting fittings available for Coronation lighting displays.

THE EDISON SWAN ELECTRIC CO., LTD., have chosen colourful and attractive devices for decorative illumination during Coronation year. Three types are available: a crown, a laurel wreath surrounding the Royal Cipher, and a shield with the armorial bearings of the Royal Standard. The crown and shield are in two sizes, 3 ft. 3 in. or 1 ft. 6 in. in height, whilst the laurel wreath will be supplied either 3 ft. or 2 ft. high. The larger units are moulded in full relief in papier maché, and the smaller units in hard rubber, both being finished in full colour.

The devices are supplied fully wired, complete with waterproof B.C. lampholders to take Royal Ediswan colour-sprayed lamps, and each device is provided with a convenient fixing batten at the back.

Ediswan shield in papier maché or hard rubber.

Apart from these moulded devices Ediswan will have flat cut-out hardboard crowns and the Royal Cipher, each 3 ft. 4 in. in height, sprayed red and supplied fully wired complete with waterproof B.C. lampholders to take Royal Ediswan white or colour-sprayed lamps, with or without garland reflectors.

Ediswan garland reflectors are of corrugated metal, 7 in. diameter, with a high silver mirror finish. They are specially made to fit over the lampholders on the various devices, or on Ediswan illumination strip, where they are secured by a spring.

Ediswan illumination strip consists of two single-core cables or one twin cable of suitable rating with pin-contact lampholders mounted at intervals. It provides an excellent method of mounting a series of lamps for interior or exterior decorative lighting installations. By clamping the two cable cores in the separate grooves of the lampholders under uniform pressure no crevice is left for the entry of moisture, and the strip will remain watertight even under the most adverse conditions. Two kinds of strip are available; one is ideal for devices, alcoves, arches, tree illumination, etc.; the other is to be preferred when long lengths of a strip need to be suspended between fixed points without intermediate support.

Ediswan illumination strip can be supplied with either rubber sleeves or rubber gaskets. If garland reflectors are to be used, gaskets are essential.

For interior illumination two types of decoration light sets are available. No. 1 set comprises 12-20-volt 3-watt 19-mm. conical lamps sprayed in assorted colours, loop construction, including B.C. adaptor. No. 2 set comprises 12-20-volt 3-watt 19-mm. clear lamps, loop construction, including B.C. adaptor. Lamps are enclosed in miniature pastel-coloured shades, pictorially decorated with popular nursery rhymes.

A special new pack for their fairylights has been introduced by the BRITISH THOMSON-HOUSTON CO., LTD. The pack contains 12 lights and forms a combined

display piece and lighting set, the lamps being inserted on the outside of the box lid to form a crown. The lamps are, of course, red, white and blue.

CROMPTON PARKINSON, LTD. offer a complete range of equipment for Coronation displays. Chrysaline devices include fleur-de-lis, thistle, crown, Tudor rose, laurel wreath and Union Jack. Other illuminated units designed for mounting on background panels to provide a variety of displays include a portrait of H.M. The Queen, the crown, Tudor rose, Scottish thistle, Welsh dragon and cut-outs of the Royal Cipher.

THE GENERAL ELECTRIC CO., LTD. has designed four decorative street-lighting lanterns for the Coronation. Two of these lanterns are made entirely of Chrysaline, except for the cast-iron spigot caps. In one, a white inverted cone widens to a blue cushion surmounted by a fully coloured crown. The second is in the form of an octagonal lantern, the panels of which can be flock-sprayed with a variety of colours, including red, white and blue, the conical wooden finial being gilt.

A third post-top lantern has a crown fully modelled in laminated paper with plywood ribs. The stepped, circular sides of the body of this lantern are fitted with glossy, semi-transparent sheeting in red, white and blue. A second laminated paper lantern, finished in full colours, is arranged for four-point suspension. The "crown-and-cushion" top section is fully modelled, with laurel panels moulded in relief below. Semi-opaque material forms the back and front panels which are silk-screen printed with a lion rampant and the Royal Cipher.

The G.E.C. also has a wide range of fittings and Chrysaline devices for decorating the façades of buildings. Chrysaline offers many advantages for outdoor applications. It is as attractive to look at in the daytime as at night. It is weatherproof and non-inflammable. It is light in weight, which makes erection easy and enables it to be safely suspended by wire or cable. Chrysaline devices possess a permanence which is not unimportant in these days of financial stringency; they may be stored away for re-use on other occasions of national rejoicing. Brilliant and colourful, single-motif Chrysaline designs include the crown, fleur-de-lis, Union Jack and shield, a Union Jack surrounded by a laurel wreath, Tudor rose, and thistle. These are all being made in a number of different sizes. There are also a spike-shaped finial for the tops of flagpoles and a 5-ft.-long border unit for mounting over doorways.

These Chrysaline devices are not intended necessarily to be used on their own, but as part of a complete illumination scheme. The G.E.C. also has available a number of composite units incorporating coloured lamps, metal reflectors, flags, banners, and red, white and blue fluorescent tubes.

For outdoor decorative lighting in gardens and open spaces floral festoons, illuminated banners, and decorative lanterns are available. Floral festoons consist of a string of small hexagonal metal reflectors each housing a 40-watt coloured lamp, which when

Ediswan laurel wreath.

illuminated give the effect of a string of flowers. Two of those available are supplied with a cross-bar for pole mounting.

KNIGHTSHADES, LTD., announce their range of outdoor illumination equipment for the decoration of hotels, restaurants, shops, public buildings, streets, homes and gardens. The novelty illumination devices include low-priced lamp shades, flounces and shields in red, white and blue. More elaborate designs cover pennants, window boxes, wall plaques, suspension bowls, crowns, pelmets and drapes. All items are made up in new fabric-like plastic material which is waterproof and will withstand all weathers. The colours are vivid and look attractive even when not illuminated during daylight hours.

PHILIPS ELECTRICAL, LTD. announce three Coronation decoration devices. The first two consist of weatherproof plaques of fibrous plaster, incorporating a portrait of Her Majesty, illuminated by coloured sign lamps. In each case the portrait is surrounded by the conventional crowned laurel wreath,

with Tudor roses at nine points. Each rose conceals a lampholder and is recessed for a sign lamp. One portrait is a sculptured low relief, finished in a warm shade of ivory, while in the other version the portrait is a full colour reproduction of a recent Dorothy Wilding study.

Each plaque is supplied coupled with a 6-ft. flexible lead and 12 coloured lamps (including three spares) and is separately and strongly packed. The list price of both versions is six guineas complete.

The third item is a neat and colourful crown, cut-out in stout card, and arranged so that a standard decoration lamp set can be fitted very readily into it. The crown, with the lamps, can either stand or be hung up.

THORN ELECTRICAL INDUSTRIES, LTD., as an addition to their range of fluorescent and incandescent lighting available for the Coronation, are now producing a special neon lamp for decoration purposes. The lamp filament forms, in glowing outline, a crown above the letters E.R. The lamp will be produced to operate in standard fittings on normal voltages and can be obtained with the filament design in either the cap up or cap down position.

Obituaries

E. W. MURRAY

It is with deep regret that we report the death on December 16 last of Mr. E. W. Murray, formerly Curator of the Industrial Museum in Horseferry Road, Westminster.

Mr. Murray joined the Office of Works in 1916 and in the early 1920s was engaged on the conversion of the building in Horseferry Road for the new Home Office Industrial Museum. He took great interest in this work and in 1925 he was asked to take over responsibility for the museum, which he did, being in charge until he retired in November, 1951.

He was very well known throughout the country for his great interest in lighting and safety, and he gave many lectures on the subject. He was an Associate Member of the I.E.E. and a Fellow of the I.E.S.; he had served on the I.E.S. Council and was its honorary treasurer in 1939-40. In the course of his long period of service with the Home Office and later with the Ministry of Labour he came in contact with many thousands who were interested in industrial safety and who sought his advice.

We extend our sincerest sympathy to Mrs. Murray and her sons and daughters in their sad loss.

S. E. DOANE

Mr. S. E. Doane, internationally known lamp and lighting pioneer, died on December 9 at his home in Connecticut, U.S.A., at the age of 72.

He was a past president of the Illuminating Engineering Society of the U.S.A. and for many years chief engineer of the National Lamp Works of the General Electric Company of the U.S.A. Under his leadership the Engineering Department and Lighting Institute at Nela Park achieved international prestige.

SITUATIONS VACANT

DESIGNER / DRAUGHTSMAN, with experience, required for the design and development of fluorescent and incandescent lighting fittings, and also the preparation of lighting schemes. Permanent post and substantial salary for the right type of man. Apply Herman Smith, Smithlite Limited, Empire Works, Dudley, Worcs.

THE BENJAMIN ELECTRIC LTD., Brantwood Road, Tottenham, N.17, invite applications for assistants in their new development laboratory.

Applicants should preferably be 23/28 years of age with scientific education to Higher National Standard. Experience in one or more of the following categories especially useful:—

(a) Physics or Electronics—for problems associated with control gear for discharge lamps.

(b) Illuminating Engineering with experience of Photometry.

(c) Electrical Engineering—for investigation of electrical, optical and thermal properties of lighting fittings.

Apply by letter, giving full details of age, training and experience and salary required for attention of Chief Technical Engineer.

SITUATIONS WANTED

A.M.I.E.E., with over 30 years' engineering experience, desires position in electrical or illuminating engineering in Scotland. Box No. 840.

Registered LIGHTING ENGINEER (30) Nat.Cert.E.E., desires position technical sales. Midland area preferred.—Box No. 842.

Cold Cathode Lighting Installation

A description of the world's largest installation of cold cathode fluorescent lighting which has been carried out in a North of England engineering works.

The most extensive cold cathode fluorescent lighting project in the world, comprising over twenty-three miles of cold cathode tubing, is now nearing completion at the Heaton Heavy Engineering Works of C. A. Parsons and Co., Ltd., Newcastle-on-Tyne. The lighting scheme, which began as a bold experiment with G.E.C. cold cathode lighting in one of the foundries in 1947 and will have taken six years to complete, is on a scale which no photograph can satisfactorily convey. Nor can a photograph give a satisfactory impression of the psychological value to workpeople of this outstandingly successful installation. Part of a general scheme of expansion and modernisation, the lighting was planned by the Engineering Department of C. A. Parsons' works in collaboration with The General Electric Co., Ltd., who supplied all the lamps, lighting fittings, and auxiliary gear. Altogether, a floor area of 454,000 sq. ft. of engineering workshops has been illuminated so far. The final section, a new research building, covering 120,000 sq. ft., to be completed in 1953, will employ troughed aluminium ceilings as a combined lighting and heating medium. These have already been installed experimentally in two laboratories.

Since the initial capital outlay on a lighting scheme of this type is considerable, there must be a strong inducement in the saving on maintenance and running expenditure. Before the scheme is adopted, what are the

The turbo-alternator erecting shop where six lines of triple tube cold cathode industrial fittings give an average level of illumination of 12 - 15 *lm./ft².*

The turbine blade rolling shop, 360 ft. long, in which the raw material is rolled to the required blade profiles. The average level of illumination achieved is 12-15 lm./ft².

factors that make cold cathode lighting in an engineering works such an excellent proposition?

First, of course, most large industrial organisations operate a night shift, which entails work by artificial light for at least 16 hours a day during winter months and nine hours a day during the summer. Time spent on changing lamps mounted at 40 ft. or higher is wasteful. Since the only means of access to lamps in a high bay is from crane platforms, every change of lamp puts a crane out of operation for several minutes, and takes an electrician away from other work for at least a quarter of an hour. Thus the 15,000-hour average life of a cold cathode tube, which will not require replacement for several years, entails a great saving compared with other types of lamps on maintenance, time and wages. This is an important consideration, particularly at a time when salaries and wages account for half the cost of most manufactured products.

Secondly, the introduction of excellent, even, general illumination from an extended light source renders the provision of local tungsten lighting for individual machines unnecessary, with a consequent saving on tungsten lamp current consumption.

Thirdly, with well-planned cold cathode lighting there is an absence of unwanted shadows and glare which makes working conditions generally more congenial.

Lamps and Fitting

A special heavy duty fitting has been employed throughout, mostly with triple tube arrangement, but in some cases four tubes employed in the same fitting have been found both technically and economically more suitable. The fitting is completely self-contained with three-pin plug and socket arrangement for connecting to normal lighting mains. The overall consumption of the complete three-tube arrangement is 250 watts and standard Osram 9 ft. 6 in. cold cathode tubes (lighting length 8 ft. 6 in.) of "Intermediate" colour are used throughout. The vitreous enamel reflectors are built in two 4 ft. 3 in. lengths, easily removable for cleaning without the necessity for removing lighting tubes.

Heavy and Light Foundries

A foundry provides a severer test of a lighting system than almost any other industrial building. In the heavy foundry at Parsons' works, which was the first foundry in Great Britain to be illuminated by cold cathode tubes, the average illumination given at floor level by fittings at a mounting height of 42 ft. is 10 lm./ft².

Though the accumulation of dust on the tubes may reduce this illumination value after a few months, a twice-yearly cleaning restores it even now, after 9,000 hours' burning, to 9 lm./ft^2. In the light foundry the almost total absence of shadows, in spite of the presence of much tall moulding machinery, is remarkable.

Pipe Division

The pipe division comprises three bays, 40 ft. 6 in. high from the normal floor level to eaves. Two are 450 ft. long and 60 ft. wide, and the third is 600 ft. long by 60 ft. wide. This division handles the fabrication of high-pressure and other piping for new power stations and similar installations. Pipes range in type from mild steel to special chrome-molybdenum steels and in size up to 12 in. bore with wall thickness up to 1¼ in. Here good even illumination for a total area of 92,000 sq. ft. is provided by lines of cold cathode tubes mounted at 35 ft. along the roof and at 20 ft. along the sides of each bay. Work can be carried out in comfort, and all projecting obstacles can be quickly and easily seen. The average level of illumination is 9 lm./ft^2.

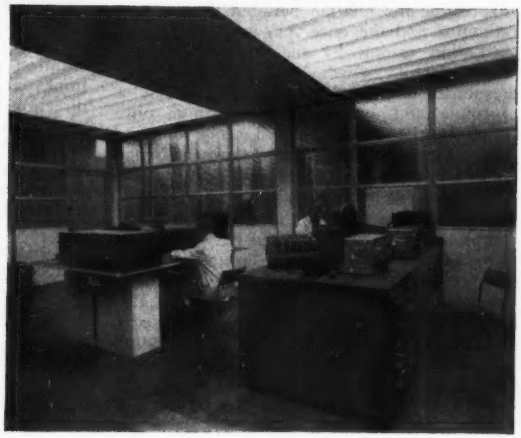
(Above) Each half of the reflector fitting used can be slid out without removing the tubes.

Condenser Bay

In the condenser bay, condensers up to the largest sizes are manufactured and assembled. The presence of these bulky, tall, light-absorbing steel fabrications would, if the lighting were not suitably planned, give wide, black shadows. Cold cathode triple-tube fittings mounted at 35 ft. in two lines along the roof and at 22 ft. along the sides of the shop give an average service illumination of 90 lm./ft^2 over an area of approximately 21,000 sq. ft. and, because cold cathode tubes are a low brightness large area light source, shadows have been almost completely eliminated.

Assembly Shops

The blade rolling and assembly shops are each 360 ft. long, 57 ft. wide and 26 ft. 9 in. high from normal floor level to eaves. In the former the raw material is rolled to the required blade profiles, both for strip blading and integral root blading (in which blade and section are in one piece). The adjoining blade assembly shop is used for assembly and machining operations on all types of blading. Cold cathode lighting in these shops gives such efficient general illumination (an average of 14 lm./ft.^{2}) that no independent lighting is required on individual machines, although they are performing particularly intricate operations. In the annexe to these shops, where finished integral blades are ground and polished, the lighting fittings have been arranged at an angle inclined to the work to give maximum illumination efficiency.



(Right) One of the four laboratories where an experimental use of anodised aluminium in conjunction with the lamps has been adopted. The aluminium troughs, which are connected with steam pipes, serve as a combined lighting and heating medium.

Heavy-Machine Shops

Two heavy-machine shop bays filled with heavy machine tools and heavy cranes handling turbine rotors and stators, are 560 ft. long and 40 ft. wide and have triple-tube fittings mounted at 35 ft. above floor level and at 22 ft. at the sides. Two assembly bays, 400 ft. x 40 ft. and 430 ft. x 80 ft., used for the assembling of large turbo-alternators up to 100 mw. have similar fittings mounted at 35 ft. above floor level and again a row of fittings at each side at 22 ft.

The merits of a low-brightness large-area light source are most striking in these bays, all surfaces in both horizontal and vertical planes receiving a share of the available illumination, thus eliminating brightness contrasts and heavy shadows. Furthermore, very few individual supplementary lights are required, and there are no stroboscopic effects on revolving machinery.

Transformer Shop

From a lighting aspect the new transformer shop, in which the largest and highest voltage transformers and reactors are constructed for the electricity supply industry, is worthy of particular notice, in view of the loftiness of the building. Although the five lines of cold cathode tubing are mounted beneath the roof, and the distance from floor to eaves is 54 ft. 6 in., the average illumination level is, nevertheless, 12-15 lm./ft^2.

Research Laboratories

The new lighting scheme adopted for some of the research laboratories is an interesting experiment in the use of aluminium as a combined lighting and heating medium. The aluminium troughing, which is connected directly to steam pipes, is anodised to improve its light-reflecting properties. Lines of cold cathode tubing are located in the aluminium troughs, and for acoustic reasons the aluminium is perforated. The excellent illumination of from 50 to 60 lm./ft.^{2} given by this system is proving ideal for the close work which is involved in assembling scientific instruments.

Correspondence

Discomfort Glare Formulae

To the Editor, LIGHT AND LIGHTING.

Dear Sir,—Dr. Hopkinson does well to remind us of the dangers of progressively simplifying or manipulating the various formulae which have been suggested by research workers on glare mechanism. Such formulae are not physical identities, but are a convenient mathematical shorthand for expressing the relation between the physical stimulus and the observer's response to the sensation caused by the stimulus. Many other factors which affect the observer's response cannot be included in such a formula and, moreover, the formula only applies to a closely limited range of conditions, more limited indeed than the range of the experiments, as Dr. Hopkinson emphasises in his papers.

But it is too optimistic to suggest that the undoubted advances made in the past forty-two years should have given us sufficient confidence to improve on Professor Weber's guess of 2.5 cd./in.^{2} stated in 1910. The 1937 Factory Act stated a limit of 10 cd./in.^{2}; the 1944 Report on "The Lighting of Buildings" stated a limit of 5 cd./in.^{2} which was endorsed in the I.E.S. Code and in the 1952 Report on Office Lighting; the Minister of Education made a regulation in 1951 stating a limit of 2.2 cd./in.^{2}, thereby completing the circle. A problem no less difficult than the investigation of glare is to describe the results of past investigations in terms which can be understood by both the lighting engineer and the legislator so that the fruits of the investigations can be enjoyed.

The danger of careless application of the formula remains, although it is only a poor man who has been blinded by science who would allow himself to be led to the conclusion that discomfort glare is dependent solely on the photometric brightness of the source. The man in the street, who has the scantiest knowledge of glare, realises, if he thinks about it, that both adaptation and direction affect the degree of dazzle. Those of us who have read Dr. Hopkinson's writings realise that contrast is an important factor in assessing discomfort glare, but experiments are needed into methods of expressing our present knowledge in a way that does not lead to dangerous simplification. Can we hope that the present revision of the I.E.S. Code will include an up-to-date and authoritative statement on the factors associated with glare? Such a statement must, of course, be incapable of being misconstrued in the manner against which Dr. Hopkinson has warned us.

J. G. HOLMES.

*London, S.W.*1.

Recent Street Lighting Installations

Salford

The new lighting on Eccles Old Road, Salford, with 109 Metrovick "SO Fifty-Two" lanterns and 140-watt sodium discharge lamps, replaces an installation of 500-watt metal filament lamps and shows a saving of nearly 50 per cent. in current, while the light output on the road is increased between 6,000 and 7,000 lumens for every 100 ft. of road.

The road, which is lighted in accordance with Ministry of Transport regulations for Group "A" roads, carries a considerable amount of traffic between the Docks and Trafford Park, and the North.

The "SO Fifty-Two" lantern used for this installation consists essentially of a plastic hood carrying the refractor plates and a cantilever casting which supports the entire lantern on the bracket. The hood is formed from clear "Perspex," ¼-in. thick, to which the refractor plates are hermetically sealed. The top of the hood is opalised, forming a diffusing reflector to re-direct a large proportion of the light flux downwards and to give a particularly pleasing night-time appearance to the lantern.

The cantilever casting supporting the hood and the lamp is made of aluminium alloy which helps to reduce the weight of the lantern while at the same time it is sufficiently strong for the loads imposed upon it. It also carries the supports for the lampholder and the lamp and is drilled to receive the bracket arm tube to which the lantern is held by two steel set screws. Heavy gauge metal straps are used to attach the hood to the casting and to maintain correct alignment of the optical system. The unit is supplied wired to a two-way terminal block, and an earthing screw is provided. Full advantage is taken in the design of the characteristics of the open type lantern which enable easy erection and maintenance.

Eastbourne

Devonshire Place, Eastbourne, a typical boulevard type of street, is the main approach road from the shopping areas to the sea front, parades and bandstand. For many years street lighting has been by means of 300-watt filament lamps suspended by span wires across the 60-ft. carriageway.

A new street lighting installation became urgent when it was found, on examination, that the steel poles supporting the span wires were deteriorating rapidly. The staff of the East Sussex and South-West Kent-Sub-Area of the South-Eastern Electricity Board was entrusted with the design of the new installation.

Devonshire Place is used by pedestrians as well as vehicles, it has ornamental flowerbeds in wide grass verges on both sides of the road, and the property which makes up the street consists of good-class hotels, select residential flats and private nursing homes.

It was felt that a very important consideration must be that the new installation should be in keeping with the road itself and its houses, both the night and day appearance being amenable and attractive. The normal consideration of good lighting appropriate to the traffic conditions must also apply, but the colour of the lighting was also of great importance.

Some form of fluorescent lighting was, therefore, decided upon, and finally a B.T.H. Co. vertical lantern was selected as satisfactory from all points of view. It was decided that the columns should be placed along the centre of the wide carriageway, that the mounting height should be to the order of 25 ft. and the spacing not more than 120 ft. It should be noted that in addition to the 60-ft. carriageway there is on each side a 10-ft. grass verge with flowerbeds and a 10-ft. slabbed footpath, making a total width of 100 ft.

The lantern chosen houses six 3-ft. 30-watt fluorescent lamps arranged vertically in a circle and enclosed by a clouded "Perspex" tapered cylinder.

Concrete Utilities supplied the columns, which were made up from a selected light shingle aggregate and then polished. The final mounting height was 25 ft. to the centre of the light source. Services were taken from L.T. distributors already available.

Finally, after experiment, it was decided that the colour of the lamps should be a mixture of three natural and three white fluorescent lamps in each lantern, as these were thought to give the best results for all purposes. The complete installation was put into operation on May 19, 1952, and generally speaking, having regard to the revolutionary style of lighting, comments have been favourable. Indeed, spontaneous appreciation of the installation has been common.

New installation at Devonshire Place, Eastbourne.

Plymouth

The new Plymouth which is rising out of the chaos and destruction wrought by enemy bombers during the war makes a forceful impact on the visitor. New roads and a new shopping centre have made their appearance where only a few years ago were 150 acres of untidy emptiness. As part of the city's replanning the South Western Electricity Board, on behalf of the city authority, has redesigned much of the street lighting using equipment supplied by The General Electric Co., Ltd. In the city centre and other shopping centres, fluorescent and mercury lighting are replacing tungsten, while mercury lighting has been installed along the new Crownhill by-pass from Plymouth to the Cornwall ferries.

New George Street and Mutley Plain are among the streets in which new fluorescent lighting has been installed. Down the centre of New George Street the first 12 "Three-Eighty" fluorescent lanterns, each housing three 5-ft. 80-watt fluorescent lamps are arranged in pairs on six specially designed concrete columns at a mounting height of 25 ft. The designers, by allowing a slight dihedral on the arms and incorporating a special finial, have given a cohesion to each column which it would otherwise lack. Nine more double columns also accommodating G.E.C. "Three-Eighty" fluorescent lanterns have been erected down the centre of Mutley Plain, spaced at 100-ft. intervals, and seven single columns of similar design have been mounted at the sides.

The Crownhill by-pass from Plymouth to the ferries has considerably speeded the passage of traffic from Plymouth to Cornwall. For one and a half miles along the centre reservation of this road 82 G.E.C. "Blown Glass" cut-off lanterns with 400-watt mercury lamps illuminate the dual carriageways, each of which is 24 ft. wide. The concrete columns are spaced at 90 ft. and lanterns mounted at 25 ft. The saving in the number of columns by using this system enabled excellent lighting to be obtained at minimum cost.

Along 1¼ miles of the A38 road leading out of Plymouth to Exeter, 51 G.E.C. "Dioptrion" lanterns housing 250-watt mercury lamps are mounted by brackets on concrete columns spaced at 120 ft. Although the carriageway is in places 50 ft. wide the resultant illumination of the whole road is excellent, brackets with a 6-ft. overhang being used on the wide sections. Further additions are being made to this road by the erection of 22 "Dioptrion" lanterns and columns.

In Wolseley Road, from the Milehouse omnibus depot to Camelshead Corner, lanterns accommodating 400-watt mercury lamps, mounted on concrete columns are to be erected so that the lighting will harmonise with that in the Crownhill by-pass.

Mutley Plain, Plymouth, by night.

Nighttime view of the Sutton By-pass.

Sutton

Until recently the Sutton By-Pass was a typical example of how not to light a first-class road. Originally constructed in 1924 with a 30-ft. carriageway, which was in 1938 widened to 44 ft. and cycle tracks added, this main artery between London, the Southern Counties, Brighton, and the coast had lighting not even up to present standards for side roads.

Since last October, the Sutton By-Pass has been one of the most effectively lighted roads in the London area.

The new lighting installation was designed by the Borough Engineer and Surveyor, Mr. N. H. Michell, A.M.I.C.E., M.I.Mun.E., with Crompton "Aries" lanterns equipped with 140-watt sodium lamps and carried on Stanton No. 6B columns. A total of 156 lanterns is used along a nearly four-mile length of the road to give a remarkable uniformity of road brightness, having regard to the 44-ft. width of the carriageway.

With the "Aries" lantern light-control is by means of a cylindrical crystal glass refractor unit held between cast end-plates with extension arms for suspension from a horizontal bracket tube. The advantages of the cylindrical refractor unit are: first, the prism formation in conjunction with an internal reflector ensures light-control through 360 deg. and therefore high efficiency; secondly, the dispersion of light over so large a refractor area ensures low source brightness; and thirdly, rotation of the refractor unit between the end-plates allows adjustment of the angle of elevation of the main beams with respect to road gradients, for which purpose a calibrated scale is provided. Corrosion resistant materials or materials protected against corrosion are used throughout the lantern construction.

Cambridge

In the near future the many major traffic routes in and about the City will switch from gas to sodium lighting. In order to carry out the conversion economically it was decided to adapt as many of the existing gas columns as possible and only to move those columns which were badly sited. This involved the re-erection of some 60 columns out of a total of 390. An ascending arm bracket is clamped to each column to give the correct mounting height for the lantern of 25 ft.

The lanterns, together with the sodium vapour lamps, the ascending arm brackets and the lamp control gear (which is housed in a weatherproof box fixed to the base of each column), were designed and supplied by the B.T.H. Co., Ltd.

The Eastern Electricity Board are undertaking the electrical installation, and are working in close collaboration with the Eastern Gas Board to ensure the minimum inconvenience to road users during the period of changeover from gas to electric lighting.

Floodlighting of Government House, Hong Kong

By A. F. MAY,
Assoc I.E.E.

Describing the illuminations of Government House, Hong Kong, on the occasion of the visit of Her Royal Highness the Duchess of Kent.

Government House, Hong Kong, is situated on a small spur 190 feet above the harbour on the lower slope of Victoria Peak, which rises steeply to about 1,750 feet above sea level on the island of Hong Kong.

The House, reconstructed by the Japanese during their occupation of the Colony, has an imposing tower which is a landmark for miles around. The house may be seen from the front for over a mile across the harbour and still farther for two or more miles into the foothills of Kowloon on the mainland. It may also be seen to the east and to the west for about two miles on the harbour itself, and from behind and on both sides where there are several roads spaced a hundred or more feet apart on the mountainside joined by roads winding up from the city of Victoria below. Upon these roads are situated the residences of Hong Kong's business taipans and the higher Government officials.

Government House is, therefore, not only seen from all directions, but also from many angles above and below the horizontal, and from near and far, and in illuminating the building an endeavour had to be made to produce results which would be pleasing from all points of view.

It was known that the British General Electric Company had produced a special "Singapore" floodlight which had been developed to suit the particular requirements encountered on the Singapore Municipal Buildings. As a result, an order was given to the G.E.C., Ltd., to supply suitable floodlights for the front of Government House; however, before the lights arrived, it was concluded that floodlighting of the front of the House only would be inadequate, and, as time was too short to obtain additional lights

Night-time view of Government House seen from the harbour, north side.

to illuminate the building on all sides, lights were designed and made in the Public Works Department Electrical Workshops. These lights are named "Hong Kong" floodlights for brevity in referring to them later.

The lights which arrived from the G.E.C. consisted of fourteen "Singapore" floodlights, four "Blackfriars" floodlights and two "Dover" floodlights, and later three additional "Singapore" floodlights and four "Dover" floodlights were obtained from the G.E.C.'s local branch, and these, added to forty-six "Hong Kong" floodlights, numbering seventy-three all told, with a total loading of 40 kw., were suitably disposed around and on the roof of the House.

To begin with, only the lights on the front face of the House were switched on, but, although the effect seemed fairly good viewed from close up, as one moved farther away from the building the weather staining and shadows cast by the balcony, eaves and turrets became more and more apparent, producing disappointing results. So much so, that, when viewed from half a mile away across the harbour, the front face above the balcony appeared to be cut off, the tower appeared to be toppling over and the face above the turrets seemed completely detached; then as one moved east or west the House presented a "flat-picture" effect, the tower thinning off and becoming hardly recognisable at 45 deg.

The next step was to switch on the lights on the roof and on the other sides of the House, and this made the flat picture effect disappear. Lights were now repositioned and adjusted to eliminate shadows caused by the "spill over" of light in places where the various wall faces varied in depth and height.

Lights were now put inside the balcony and their intensity and angles adjusted to match the lights on the face below; this overcame the "cut-off" effect mentioned. Lights were also put in the narrow turrets on the tower to eliminate the "detached" effect and, to ensure that the upper face should have adequate illumination when viewed from a distance when this was done, a slight over-brightness near the turret could not be avoided.

The illumination of the front face of the tower was done in three sections, and adjusting the focus of the lights to obtain an even brightness was found difficult due to the weather staining which produced a shadow effect that could not be entirely eliminated on the corners; however, the tower no longer appeared to be toppling over.

To serve the other three sides of the tower lights were mounted on the roof and focused in the same manner as those on the front face. It was found, however, that the source of light on these and a number of the lights on the ground could be seen from the roads on the mountainside and, to overcome this difficulty, they were each fitted with a

rectangular bell-mouthed cowl painted matt-black on the inside. The angle of each cowl was made to allow light to cover a certain area only, with the result that "spill over" of light was negligible and observation of the source of light from any point on the roads above was entirely eliminated.

The illumination outside the main entrance porch was subdued and the face brightness gradually increased on the walls in both directions away from the porch. Inside the house the illumination was increased from the porch to the entrance hall, and again from the entrance hall into the reception hall, the latter having indirect cornice lighting. The purpose of the graduation was to obviate the undesirable effect of dinginess experienced when passing from a brightly lighted area to one of lesser intensity.

The flat gardens and lawns of Government House, where guests would congregate, are comparatively narrow; the lights on the ground were therefore of necessity concealed in the foliage close to the house, the foliage also serving to reduce the over-brightness on the lower face occasioned by this arrangement. The trees and shrubbery silhouetted against the walls produced a pleasing effect

A number of the larger trees in the grounds on the harbour side were covered in fairylights; one tree, about 50 ft. high, having approximately 800 lights spaced 3 ft. apart. This installation was accomplished by erecting a bamboo scaffold tower about 35 ft. high which could be moved about from place to place by six men From the top of the tower two men applied the fairylights to the tree in a vertical zig-zag manner using long bamboo poles fitted with inverted hooks, the men below passing the lights up to them with similar poles. This method of application was most effective, the lights seeming to be sprinkled on quite evenly yet with no regularity, the result being a great improvement as compared with the usual method of horizontal looping of lights.

Other trees near the main entrance on the mountainside of the House were floodlit with cowled lights placed on the branches and in clusters of palms. These produced a warm inviting effect as contrasted with the otherwise dark shapelessness of trees and shrubs accentuated by a slight dazzle caused by the reflected light from the building.

Acknowledgment is made to His Excellency the Governor of Hong Kong for permission to publish this article.

I.E.S. ACTIVITIES

London

At a sessional meeting in London, on December 9, a paper entitled "Visual Fatigue" was given by H. C. Weston, F.I.E.S.

Visual fatigue is frequently referred to in modern discussions on the effects of different lightings. It is vaguely, and sometimes ill-, conceived. The ordinary meaning of "fatigue" is "weariness resulting from bodily and mental exertion." How can such a state be associated with vision? To understand this, the nature and extent of the activities involved in seeing must be appreciated. Of these activities those of the light-receiving retinae do not appear to yield any sensations except those of luminosity and colour, and these are not responsible for the feeling that prompts complaints of "visual fatigue." But the eyes containing the visual receptors are motorised, and energy is constantly expended in moving, focusing and posturing them in the ordinary course of seeing.

The strictly visual muscles—those necessarily innervated for every act of vision—number more than 20; but, in addition, some of the muscles of the face, head and neck are commonly involved, while the whole voluntary neuro-muscular system of the body may participate in the most intent vision. It is when the muscular exertion to see is excessive that feelings of fatigue arise. Such exertion is prompted when visual perception is troublesome to the mind, and is inadequate for personal needs, as it may be on account of bad lighting, minuteness of object-detail, or ocular defects. Excessive exertion of the ocular muscles of convergence and accommodation for near work is the chief cause of the localised fatigue commonly called "eye-strain," but unduly frequent and overlong posturing of the eyes for seeing more remote things is also fatiguing. The downward gaze demanded for many visual tasks is probably a more important factor in the causation of fatigue in seeing than is generally recognised. It is shown, by photographic records, that depression of the eyes themselves tends to be limited to not more than half the possible downward excursion—more than this being rapidly tiring. Further angling of the gaze is often required but is usually effected by bending the neck and, if necessary, the trunk. The "pain in the neck" which thus keeps down the oculo-motor fatigue is part of the total bodily fatigue occasioned by seeing.

Other contributions to this general fatigue are made by exertion of the facial muscles (as in frowning) which occurs in the presence of glaring light sources; although it is shown that such sources may not provoke this exertion when vision is uncritical, while frowning may occur in any lighting—as well as during visual inattention—if the mind is sufficiently troubled. Some lightings are said to be "tiring" because they encourage somnolence. It is pointed out that somnolence is not necessarily due to fatigue. On the contrary, it often results from insufficient bodily and mental exertion. Dimness as well as nearly uniform brightness of the visual field are both monotonous and thus favourable to the sleepy state. It is suggested that boredom with the unchanging — even though physiologically satisfactory—brightnesses and brightness ratios of artificially lighted interiors may be the real basis of the objection which some people have to artificial lighting in permanent substitution for daylighting. Distracting brightnesses are fatiguing because they stimulate the fixation-reflex, which has to be overridden by a voluntary effort to keep the eyes directed where they should be.

Finally, time studies suggest that, in the absence of adequate motivation to the contrary, individuals tend to "ration" their fatigue by adjusting the "on and off" periods of critical vision so that the "average effort of seeing" is much the same for different types of work and conditions of lighting. This method of self-governance of fatigue accounts for quantitative and qualitative changes of output with changes of lighting even though fatigue itself may vary little.

Birmingham Centre

At a recent meeting of the Birmingham Centre a paper was presented by Mr.

W. T. F. Souter, F.I.E.S., entitled "Lighting of Docks and Railway Marshalling Yards."

Mr. Souter said that, with one exception dating back to 1933, there was no general code of practice for the suitable illumination of dock lighting. This one exception merely emphasised that adequate illumination must be provided for this type of lighting, recommending values of 0.25 ft.c. as being reasonable. The passage of time has brought with it continuous increases in illumination levels in most branches of lighting, so it would be reasonable to suppose that these higher standards would apply to dock lighting as well. Unfortunately, such development has been controlled by economics, consequently present-day dock lighting is a compromise between what is most desirable and what is most economic.

In recent years, however, there has been increasing recognition of the need for improved lighting as a protective measure in the interests of safety and to prevent theft; the duties of the dock police being made much easier under better visibility over large areas.

Recent installations designed to avoid glare conditions have given up to 1 lm./ft^2. In this respect the problem of dock lighting is similar to that of street lighting where visibility and the satisfactory adaptation of the eye are directly influenced by discomfort and disability glare.

The normal routine activities associated with docks and quay-sides are carried out under a high content of movable constructions, and very often under inferior lighting conditions employed for similar tasks in other spheres of life. It would seem, therefore, that badly screened light could prove most dangerous both from the point of view of work and the interference with navigational safety.

The type of lighting used resembles closely cut-off street lighting systems, where the amount of reflected light from surroundings is negligible.

Referring to the design and choice of materials used in the manufacture of fittings for dock lighting, Mr. Souter emphasised that they had to withstand prolonged exposure to stormy conditions in strong alkaline atmospheres such as salt water and rain water polluted by sulphurous smoke. With this in mind there has been a careful selection of aluminium alloys with a satisfactory silicon content, cadmium-plating of bolts, and weather-resisting exterior surface finishes.

In order to remove light sources as far as possible above the normal sight lines of dock operatives, mounting heights of 50 ft. or greater are employed. In the case of lighting narrow quays with berths on each side, very satisfactory results have been obtained with 1,000-watt concentrating floods, having a beam divergence of 23 deg. to 25 deg. mounted on towers at each end and trained longitudinally along the quay.

Referring to railway sidings and marshalling yards, Mr. Souter made the point that it was a fundamental requirement in the interests of safety for the obstructions between the railway tracks to be reduced to a minimum. Further, he pointed out that while we were accustomed to thinking in terms of horizontal illumination, the importance of vertical illumination should not be ignored in promoting good visibility in both railway yards and dock areas. It was important to remember too that these areas of work are frequently enveloped in a heavy pall of smoke and steam resulting in terrific atmospheric absorption and obstruction of the artificial lighting. An attempt to combat this obstruction has been achieved by the adoption of 400-watt mercury discharge refractor bowl lanterns arranged in clusters of three on 60-ft. wooden poles, placed at approximately 300-ft. centres. It was interesting to note that the trend of installation design was towards adoption of group fittings with powerful light sources having high-level mountings at a limited number of site positions.

Mr. Souter illustrated his talk by some particularly fine photographs of dockyard and quay-side installations. A most interesting discussion followed the paper, the principal points raised being glare conditions, absorption factors, cost and maintenance of installations, etc.

Glasgow Centre

The December sessional meeting of the Glasgow Centre was held in the Institute of Engineers and Shipbuilders. The lecture was given by Dr. A. Mellick, of Glasgow, an ophthalmic surgeon, on "Vision and Illumination." The mechanism of the eye was described in detail. The lecturer examined and explained visual acuity under varying illumination conditions. The perception mechanism for colour was described and related to various types of light source. Dr. Mellick, by means of projected graphs, showed how that almost from the earliest years of a person's life, visual acuity began to fail, thus requiring, after the late thirties

especially, increased illumination for visual perception.

The enthusiasm with which the lecture was received was shown by the large number of questions. It is interesting to note that, almost without exception, every member and visitor present had questions to pose to the lecturer.

Liverpool Centre

At a recent meeting of the Liverpool Centre, Mr. L. H. Hubble presented abstracts of the main features of each type of equipment covered by his paper "The Design of Interior Lighting Equipment," originally presented to the I.E.S. at the summer meeting at Eastbourne.

The meeting was a joint one with the Liverpool Architectural Society, and the discussion, which covered a wide range of subjects, was opened by Mr. W. Gilchrist, vice-chairman of the Centre.

Nottingham Centre

There was a large attendance at the November meeting of the Nottingham Centre when Mr. J. Woodhouse, of the Derby Borough Engineer's Department, gave a paper entitled "Street Lighting Practice."

During the course of his address Mr. Woodhouse traced the development of the science and art of street lighting over the last quarter of a century and made particular reference to the recently introduced Code of Practice for Group A lighting and also some of the problems encountered in dealing with residential roads. He went on to refer to general administration, organisation of cleaning and inspection arrangements, planning and erection of new installations and other aspects of a problem that is not appreciated by the man in the street, who is only generally interested when there is a lack of lighting for one reason or another.

The discussion which followed was opened by Mr. E. Howard, President of the A.P.L.E., and the vote of thanks was proposed by Mr. G. C. Small.

Forthcoming I.E.S. Meetings

LONDON

February 10th

Sessional Meeting. Introduction to the Ministry of Education Bulletin on Colour in Schools, by David Medd. (At the Lighting Service Bureau, 2 Savoy Hill, W.C.2.) 6 p.m.

February 25th

Sessional Meeting. Report and Discussion on the entries for the Dow Prize Competition by the assessors and presentation o awards. (At the Lighting Service Bureau, 2, Savoy Hill, W.C.2.) 6 p.m.

CENTRES AND GROUPS

February 3rd

STOKE-ON-TRENT.—"Glass in the Service of Light," by A. J. Holland. (At the Lecture Hall of the Midlands Electricity Board, 31, Kingsway, Stoke-on-Trent.) 6 p.m.

February 4th

EDINBURGH.—"Luminescence as Applied to Lighting," by H. G. Jenkins and A. H. McKeag. (At the Welfare Club Hall, 357, High Street, Edinburgh.) 7 p.m.

NEWCASTLE.—"Lighting and Vision as Age Advances," by H. C. Weston. (At Roadway House, 6 Oxford Street, Newcastle-on-Tyne, 1.) 6.15 p.m.

February 5th

GLASGOW.—Annual General Meeting. "Luminescence as Applied to Lighting," by H. G. Jenkins and A. H. McKeag. (At the Institution of Engineers and Shipbuilders in Scotland, 39, Elmbank Crescent, Glasgow, C.2.) 6.30 p.m.

NOTTINGHAM.—"New Lamps, New Uses and New Lighting Techniques," by H. R. Ruff. (At the Demonstration Theatre, East Midlands Electricity Board, Smithy Row-Nottingham.) 6 p.m.

EXETER.—"Fluorescent Street Lighting—The First Five Years," by H. E. G. Watts. At the Providence Hall, Northernhay Street, Exeter.) 7 p.m.

February 6th

BATH and BRISTOL.—"Fluorescent Street Lighting—The First Five Years," by H. E. G. Watts. (At the South Western Electricity Board Lecture Theatre, Old Bridge, Bath.) 7 p.m.

HUDDERSFIELD.—"Sodium Lamps and their Applications," by A. W. Gostt. (At the Electricity Showroom, Market Street, Huddersfield.) 7.15 p.m.

February 9th

SHEFFIELD.—"Specification and Testing of Fluorescent Lamps," by W. R. Bloxsidge. (At the Medical Library, Sheffield University, Western Bank, Sheffield, 10.) 6.30 p.m.

February 12th

MANCHESTER.—"Lamps and Lighting for Inspection," by H. R. Ruff and H. E. Bellchambers. (Joint Meeting with the Institution of Engineering Inspection.) (At the Demonstration Theatre of the North Western Electricity Board, Town Hall Extension.) 6 p.m.

February 18th

NORTH LANCASHIRE.—"Science in Electric Lamp Manufacture," by A. J. Meadowcroft. (At the Preston and District Chamber of Commerce, 49a, Fishersgate, Preston.) 7.15 p.m.

TEES-SIDE.—"Stage Lighting," by R. J. Fothergill, followed by a visit to a theatre. (At the Cleveland Scientific and Technical Institution, Corporation Road, Middlesbrough.) 6.30 p.m.

February 19th

GLOUCESTER and CHELTENHAM.—"The Lighting of Architecture," by G. Grenfell Baines. (At the Cadena Cafe, High Street, Cheltenham.) 6.15 p.m.

February 23rd

LEEDS.—"Lighting in Mines," by W. L. J. Potts. (At the Lighting Service Bureau, 24, Aire Street, Leeds, 1.) 6.15 p.m.

LEICESTER.—"Lighting for Display," by T. S. Jones. (At the Demonstration Theatre of the East Midlands Electricity Board, Charles Street, Leicester.) 6.30 p.m.

February 24th

CARDIFF.—"Modern Airport Lighting," by J. W. Morse. (At the Demonstration Theatre of the South Wales Electricity Board.) 5.45 p.m.

LIVERPOOL.—"The Development of the Tungsten Lamp," by B. P. Dudding. (Joint Meeting with the Electrical Contractors' Association, Liverpool Branch.) (At the Lecture Theatre of the Merseyside and North Wales Electricity Board's Service Centre, Whitechapel, Liverpool, 1.) 6 p.m.

February 25th

SWANSEA.—"Modern Airport Lighting," by J. W. Morse. (At the Minor Hall, Y.M.C.A., Swansea.) 6 p.m.

February 26th

BRADFORD.—"Interior Decoration and its Influence on Lighting." (At the Yorkshire Electricity Board, 45-53, Sunbridge Road, Bradford.) 7.30 p.m.

POSTSCRIPT

By "Lumeritas"

A correspondent, who, incidentally, fails in his attempts to identify me (the Editor offers no prize for a correct guess!), refers to my remarks last November on the lighting of Z-crossings. Apparently, when half-way across one of these pedestrian safety lanes he was nearly run down by a motor-van, the driver of which stopped his vehicle beyond the crossing and, having dismounted, roundly abused my correspondent for endangering the driver! Some of these crossings are now very difficult to see at night, especially if the road is wet, but when flashing beacons are in operation there will be no excuse for such incidents as my correspondent relates unless, of course, pedestrians are so foolish as to attempt a crossing when a vehicle is so near that it is humanly and mechanically impossible to stop it in time to avoid an accident. I cannot put such folly past pedestrians since I have been an eye-witness of it on more than one occasion. My correspondent assumes that flashing beacons will signify legal "protection" for pedestrians, but the jay-walker who puts his trust in this and then asks for trouble may still get the cold comfort of the mortuary slab as the reward of his folly. But, despite his assumption, it appears to my correspondent that flashing beacons are a waste of public money because, he says, motorists are not legally bound to give precedence to a pedestrian on a Z-crossing. In this he is wrong—as numerous prosecutions have shown When the flashing beacons are in operation—as they will be usually by day and night—a plea that a pedestrian crossing could not be seen will be hard to sustain. However, road users should remember that the regulations will allow the beacons to be extinguished in some places during part of the night when there are very few pedestrians about, and that during such periods when the beacons are unlighted crossings will be deprived of their legal status.

The need for a short name for the unit of illumination, in place of "lumen per square foot," has recently been voiced in the Australian "I.E.S. Lighting Review." As a result, the writer of a letter to the Editor of the "Review" suggests the name "Footlums" which, he says, "is short, simple, easy of pronunciation and combines the meaning necessary." Praiseworthy as is the attempt to find a suitable name—pending universal adoption of the metric system and then of the word "lux"—I fear that the simplicity of "footlums" is too suggestive of nursery language for the word to win many advocates. It is not that any confusion is likely to arise, even when discussing the home lighting problem of how many footlums Mummy should have when washing Johnnie's dirty "footums"—alternatively known as "tootsie-wootsies"! Nevertheless, I feel that "footlums" is uncommendable. Other names have been suggested in the pages of this journal during the past two years, but none has met with an enthusiastic reception.

Readers may recall that at the end of last November a conference of Commonwealth Prime Ministers took place in London. It was originally intended to hold the conference in the new Government offices in Whitehall Gardens, in which fluorescent lighting is installed, but, according to a Press report, the Minister of Works considered the building and its lighting ill-suited to an historic meeting. This seems an odd point of view. If history comprises past events—as the dictionary says it does—the meeting in question was not historic until it was a thing of the past; whilst the lighting installation of the unsuitable building, although but a thing of "yesterday" had at least that claim to be historic. How out of date does the Minister think the lighting of a building should be to fit it for a meeting that will become historic? How far behind the periods was the lighting at meetings, now historic, which took place in past centuries? Undoubtedly, many more notable historic meetings have been held in what, at the time, were contemporary buildings with contemporary systems of lighting.

In the annual report of the Road Research Board for the year 1951, published early last month, I noted with interest a reference to investigations by the Army Operational Research Group into drivers' reactions to vehicle braking lights. Apparently, a foot-brake-operated red light lessened by about 0.7 sec. the average time for a driver to realise that the vehicle in front was slowing down, and this time was further reduced by 0.3 sec. if the warning light was operated by the accelerator pedal. With the latter, the lamp would have to be master-controlled by the ignition switch, so as to be off when the vehicle is parked.